December 22, 2004

MEMORANDUM

TO: David Weinberg and Ephi Gur

FROM: Lenwood Hall

SUBJECT: Summary of recent diazinon and chlorpyrifos monitoring data from the Sacramento and San Joaquin River watersheds (2001-2004)

PROJECT DESCRIPTION AND RESULTS

Recent diazinon and chlorpyrifos monitoring data from the Sacramento and San Joaquin River watersheds (2001- 2004) has been summarized and analyzed in Table 1. These data were obtained from California's Department of Pesticide Regulation (DPR). DPR has thoroughly screened these data in accordance with accepted quality assurance and quality control procedures. The levels of quantification (LOQ) for diazinon and chlorpyrifos were 10 to 40 ng/L and 4 to 40 ng/L, respectively, for each OP insecticide.

Diazinon

Eight stations were sampled for diazinon in the Sacramento River watershed; twenty stations were sampled in the San Joaquin River watershed (Table 1). Diazinon was measured from a total of 685 samples collected in both the Sacramento (n = 127) and San Joaquin (n = 558) watersheds. Detected concentrations of diazinon were reported from 21% of the samples in the Sacramento River and 11% of the samples in the San Joaquin River. Diazinon concentrations ranged from non-detected to 183 ng/L in the Sacramento River watershed; concentrations ranged from non-detected to 610 ng/L in the San Joaquin River watershed. The diazinon 90th centiles were 65 and 22 ng/L, respectively, in the Sacramento and San Joaquin River watersheds. Seven percent of the samples exceeded the acute diazinon target of 80 ng/L in the Sacramento River; four percent of the samples exceeded the acute target in the San Joaquin River watershed. The chronic target of 50 ng/L was exceeded in 15% of the samples in Sacramento River watershed. Five percent of the samples exceeded the chronic target in the San Joaquin River watershed.

When the diazinon target concentration is revised to a correct value of 165 ng/L, due to an error in one the LC50 values used to develop the original water quality criterion as reported in Hall and Anderson (in press), only 0.8% and 1.4% of the samples will exceed the correct target of 165 ng/L in the Sacramento and San Joaquin River watersheds, respectively.

Chlorpyrifos

Ten stations were sampled for chlorpyrifos in the Sacramento River watershed; thirty-five stations were sampled in the San Joaquin River watershed (Table 1). Chlorpyrifos was measured from a total of 873 samples in both the Sacramento (n = 162) and San

Joaquin (n = 711) watersheds. Chlorpyrifos was not detected in any samples in the Sacramento River watershed. However, this insecticide was detected in 36% of the samples in the San Joaquin River watershed. Chlorpyrifos concentrations ranged from non-detected to 2,420 ng/L in the San Joaquin River watershed. The chlorpyrifos 90th centile for the San Joaquin River watershed was 16 ng/L. The acute (20 ng/L) and chronic (14 ng/L) chlorpyrifos targets were exceeded in 7 and 11% of the samples, respectively, in the San Joaquin River watershed.

Co-occurrence of diazinon and chlorpyrifos
There is a very low percentage of samples (4%) containing co-occurring detected concentrations of both diazinon and chlorpyrifos based on the most current monitoring data in the San Joaquin River watershed. Since there were no detected concentrations of chlorpyrifos in the Sacramento River watershed, co-occurrence of detected chlorpyrifos and diazinon concentrations was not reported from any samples in this watershed. The low frequency of co-occurrence of these OP insecticides is not surprising since the use patterns of these OPs are somewhat different. Documented low (or no) frequency of co-occurrence of diazinon and chlorpyrifos is a key result from the analysis of this current OP monitoring data set since the joint toxicity (i. e., additive toxicity) of diazinon and chlorpyrifos is considered to be a critical issue by the Central Valley Regional Water Quality Control Board.

CONCLUSIONS

Conclusions based on this analysis are as follows:

- Based on the most current monitoring data (2002-2004), detected concentrations of diazinon were reported from only 21% and 11% of the samples collected in the Sacramento and San Joaquin River watersheds, respectively.
- Diazinon concentrations ranged from non-detected to 183 ng/L in the Sacramento River watershed; concentrations ranged from non-detected to 610 ng/L in the San Joaquin River watershed.
- Diazinon 90th centiles of 65 and 22 ng/L were reported in the Sacramento and San Joaquin River watersheds, respectively.
- The acute and chronic targets for diazinon were exceeded in 4 to 15% of the samples collected in the Sacramento and San Joaquin River watersheds using the current target values.
- When the correct target value for diazinon is used (165 ng/L) less than 1.5% of the samples in both the Sacramento and San Joaquin River watersheds will exceed this target.
- Based on the most current monitoring data (2001- 2004), detected concentrations of chlorpyrifos were reported from 0% and 36% of the samples collected in the Sacramento and San Joaquin River watersheds, respectively.
- Chlorpyrifos concentrations ranged from non-detected to 2,420 ng/L in the San Joaquin River watershed.
- The chlorpyrifos 90th centile for the San Joaquin River watershed was 16 ng/L.

- The acute and chronic chlorpyrifos targets were exceeded in 7 and 11%, of the samples, respectively, in the San Joaquin River watershed.
- There is very low co-occurrence (4% of the samples) of detected diazinon and chlorpyrifos concentrations based on the most current monitoring data in the San Joaquin River watershed. Detected co-occurring concentrations of diazinon and chlorpyrifos were not reported in the Sacramento River watershed.

REFERENCES

Hall, L. W. Jr. and R. D. Anderson. in press. Acute toxicity of diazinon to the amphipod, *Gammarus pseudolimnaeus*: Implications for water quality criteria development. Bulletin of Environmental Contamination and Toxicology.

Table 1. Summary of recent Sacramento and San Joaquin River watershed chlorpyrifos and diazinon monitoring data from 2001 to 2004 obtained from the California Department of Pesticide Regulation. The acute and chronic targets are 80 and 50 ng/L, respectively, for diazinon and 20 and 14 ng/L, respectively, for chlorpyrifos.

Parameter	Chlorpyrifos		Diazinon	
	Sacramento	San Joaquin	Sacramento	San Joaquin
Period Sampled	3/20/01-2/20/04	4/11/01-9/30/03	12/8/03-2/20/04	5/21/02-9/30/03
# of Stations	10	35	8	20
# of Samples	162	711	127	558
# of Detects	0	254	26	60
% Detected	0	35.7	20.5	10.8
Conc. Range (ng/L)	ND	ND - 2,420	ND - 183	ND - 610
90^{th} Centile (ng/L)	-	16.0	64.5	22.4
% > Acute Target	0	7.45	7.09	3.76
% > Chronic Target	0	10.8	15.0	5.38